Remarks

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Thus, claim 1 has been amended to incorporate the subject matter of claim 10, as a result of which claim 10 has been cancelled. Amended claim 1 further recites "spray-drying" the solution or paste, which is supported by the disclosure at page 10, lines 9-10 of the specification.

Applicants respectfully submit that these amendments should be entered even though they are being presented after a final rejection, since the effect of the amendments is essentially to limit the subject matter to claim 10 which has already been examined, although the drying step has been limited to spray-drying. Considering the comments set forth below, Applicants take the position that entry of these amendments will not necessitate further consideration and/or search of the prior art.

Thus, the patentability of the presently claimed invention after entry of the foregoing amendments, over the disclosure of the reference relied upon by the Examiner in rejecting the claims, will be apparent upon consideration of the following remarks.

Initially, although the Examiner indicates, at about the middle of page 2 of the Office Action, that claims 1-2 and 10-14 are currently under examination, it is Applicants' understanding that claims 11-14 have been withdrawn from consideration. Therefore, it appears that only claims 1-2 and 10 were under examination.

The rejection of claims 1-2 and 10 under 35 U.S.C. §102(b) or 35 U.S.C. §103(a) as being anticipated by, or obvious over, the Bringe reference (WO '839) is respectfully traversed.

(1)   The process of claims 1-2 of the present application, as an inherent result of the process as set forth in these claims, produces dry β-conglycinin protein having a reduced hydration property which can provide a solution having low viscosity. On the other hand, Example 8 of Bringe relied upon by the Examiner is directed to the production of heat-induced gel. There is no teaching or suggestion of drying the resulting heat-induced gel in Bringe, and certainly no teaching or suggestion of spray-drying the gel after neutralization and sterilization.

(2)   Claim 18 (a method claim) of Bringe discloses the following steps:

a)   extraction of defatted soybean with an aqueous solvent,

b)   adjustment of pH to 6.7 to enhance extraction,

c)   removal of insoluble components,

d)   adjustment of pH to a suitable lower pH to precipitate protein,

e)   recovery of the precipitated protein in d),

f)   neutralization to pH 6.7 to 7.2, and

g)   drying.

According to claim 19 of Bringe, heat treatment is carried out in any step(s) between steps a) and b), between steps c) and d) and between steps f) and g). Further, claim 20 of Bringe discloses that conditions of the heat treatment are any of the following conditions:

a)   72 to 90°C for 15 to 20 seconds,

b)   80 to 90°C for 5 to 10 minutes, or

c)   120 to 154°C for 7 to 20 seconds.

However, all the steps between steps a) and b), between steps c) and d) and between steps f) and g) are in a neutral pH region. That is, the advantage of the present invention obtained by heating under acidic conditions is hardly obtainable in such a neutral pH region. In the present invention, heating is carried out at pH 3.5 to 6.0, and this pH corresponds to the pH in steps d) and e) of Bringe.

Therefore, it is clear that the heating step in Bringe is distinct from, and does not suggest the heating step in the present invention.

(3)   Regarding the Examiner's comments concerning ionic strength, noting that Applicants did not provide a reliable document and/or support for the position that 3.5% NaCl has an ionic strength of 0.58, please refer to the attached copy of the free encyclopedia, Wikipedia, where the ionic strength (Ic) is calculated by the equation disclosed therein. The Ic of an aqueous NaCl solution can be calculated as Ic = (molar concentration of Na + molar concentration of Cl)/2. In case of 3.5% NaCl, the ionic strength is 0.60 (Applicants' previously mentioned 0.58 was slightly in error).

Since other salts, in particular, salts for pH adjustment are present, practically speaking, the ionic strength 0.60 would be incorrect. However, the presence of other salts raises the ionic strength, i.e., the ionic strength of 3.5% NaCl solution is **higher** than 0.60. Therefore, it is clear that the ionic strength of Example 8 of Bringe is higher than 0.2, in contrast to the presently claimed invention where the ionic strength is less than 0.2.

Thus, according to the present invention, β-conglycinin protein powder having excellent solubility properties can be obtained by heating a solution having the ionic strength of less than
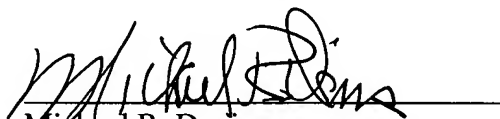
0.2 under acidic conditions and then spray-drying. Neither the process as presently claimed, nor the unexpected inherent result of this process, is described or suggested in the Bringe reference.

Therefore, in view of the foregoing amendments and remarks, it is submitted that the ground of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

Masahiro ISHIKAWA et al.

By: Michael R. Davis
Registration No. 25,134
Attorney for Applicants

MRD/pth
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
August 27, 2008

Ionic strength

From Wikipedia, the free encyclopedia

The **ionic strength**, I, of a solution is a function of the concentration of *all* ions present in a solution.

$$I_c = \tfrac{1}{2} \sum_{B=1}^{n} c_B z_B^2$$

where c_B is the molar concentration of ion B (mol dm^{-3}), z_B is the charge number of that ion, and the sum is taken over all ions in the solution. For a 1:1 electrolyte such as sodium chloride, the ionic strength is equal to the concentration, but for $MgSO_4$ the ionic strength is four times higher. Generally multivalent ions contribute strongly to the ionic strength.

For example the ionic strength of a mixed 0.0050M Na_2SO_4 + 0.0020M NaCl solution is :

$I = 1/2(2 * ((+1)^2 * 0.005) + (+1)^2 * 0.0020 + (-2)^2 * 0.005 + (-1)^2 * 0.002) = 0.017M$

Because in non-ideal solutions volumes are no longer strictly additive it is often preferable to work with molality (mol/kg H_2O) rather than amount concentration. In that case, ionic strength is defined as:

$$I_m = \tfrac{1}{2} \sum_{B=1}^{n} m_B z_B^2$$

Importance

The ionic strength plays a central role in the Debye-Hückel theory that describes the strong deviations from ideality typically encountered in ionic solutions. It is also important for the theory of Double Layer (interfacial) and related Electrokinetic phenomena and Electroacoustic phenomena in colloids and other heterogeneous systems. That is, the Debye length, which is the inverse of the Debye parameter – kappa –, is inversely proportional to the square root of the ionic strength. Debye length is characteristic of the Double layer thickness. Increasing the concentration or valence of the counterions compresses the double layer and increases the electrical potential gradient.

Media of high ionic strength are used in stability constant determination in order to minimize changes, during a titration, in the activity quotient of solutes at lower concentrations. Natural waters such as seawater have a non-zero ionic strength due to the presence of dissolved salts which significantly affects their properties.

References

- International Union of Pure and Applied Chemistry. "ionic strength, I (http://goldbook.iupac.org/I03180.html)". *Compendium of Chemical Terminology* Internet edition.

Retrieved from "http://en.wikipedia.org/wiki/Ionic_strength"
Categories: Physical quantity | Analytical chemistry | Colloidal chemistry | Electrical Double Layer | Electrochemistry

- This page was last modified on 14 July 2008, at 09:59.